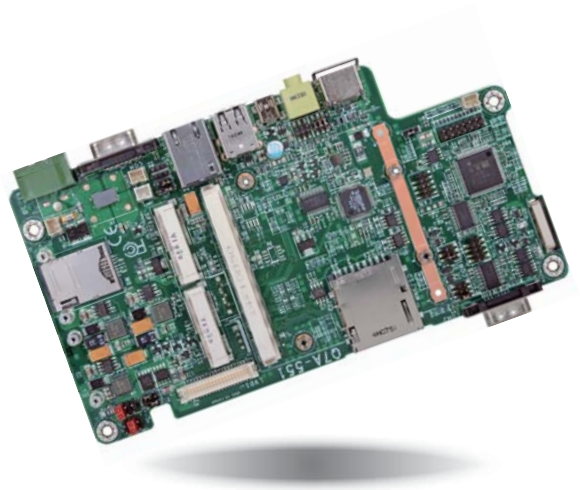
DFI®



Q7A-551

Qseven Carrier Board
User's Manual

A28400340

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Changes after the publication's first release will be based on the product's revision. The website will always provide the most updated information.

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Trademarks

Product names or trademarks appearing in this manual are for identification purpose only and are the properties of the respective owners.

FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

Notice:

1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. Shielded interface cables must be used in order to comply with the emission limits.

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About this Manual

An electronic file of this manual is included in the CD. To view the user's manual in the CD, insert the CD into a CD-ROM drive. The autorun screen (Main Board Utility CD) will appear. Click "User's Manual" on the main menu.

Warranty

1. Warranty does not cover damages or failures that arised from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.

2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.

3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.

4. We will not be liable for any indirect, special, incidental or consequencial damages to the product that has been modified or altered.

Static Electricity Precautions

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.

2. Wear an antistatic wrist strap.

3. Do all preparation work on a static-free surface.

4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.

5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.

Important:
Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

Safety Measures

To avoid damage to the system:
- Use the correct AC input voltage range.

To reduce the risk of electric shock:
- Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One Q7A-551 board
- One Power switch with cable
- One Speaker 1.5W with cable
- One QR (Quick Reference)

Optional Items

- COM port cable
- Power adapter (60W, 19V)
- EXT-KSDIO module (8-bit DIO Daughter Board)
- EXT-KSDIO cable

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

Before Using the System Board

Before using the system board, prepare basic system components.

If you are installing the system board in a new system, you will need at least the following internal components.

- Storage devices such as hard disk drive, CD-ROM, etc.

You will also need external system peripherals you intend to use which will normally include at least a keyboard, a mouse and a video display monitor.

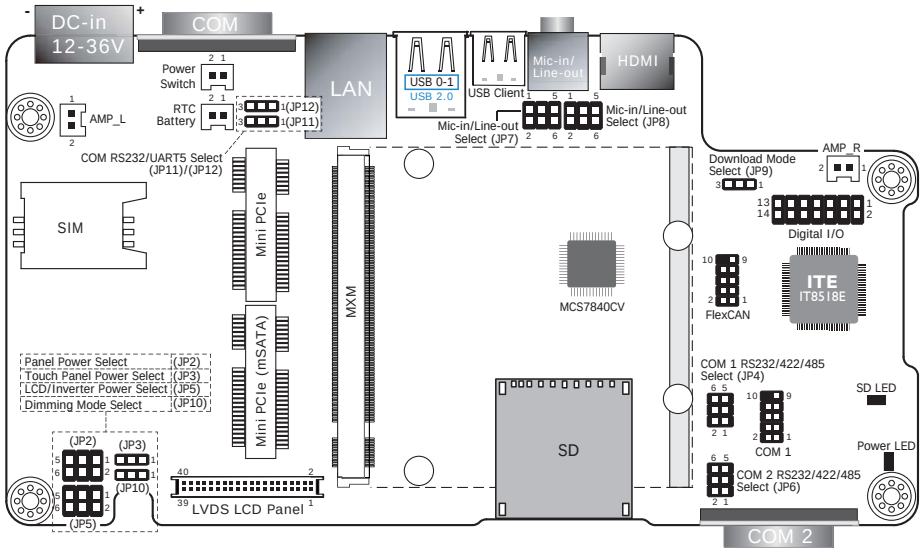
Chapter 1 - Introduction

Specifications

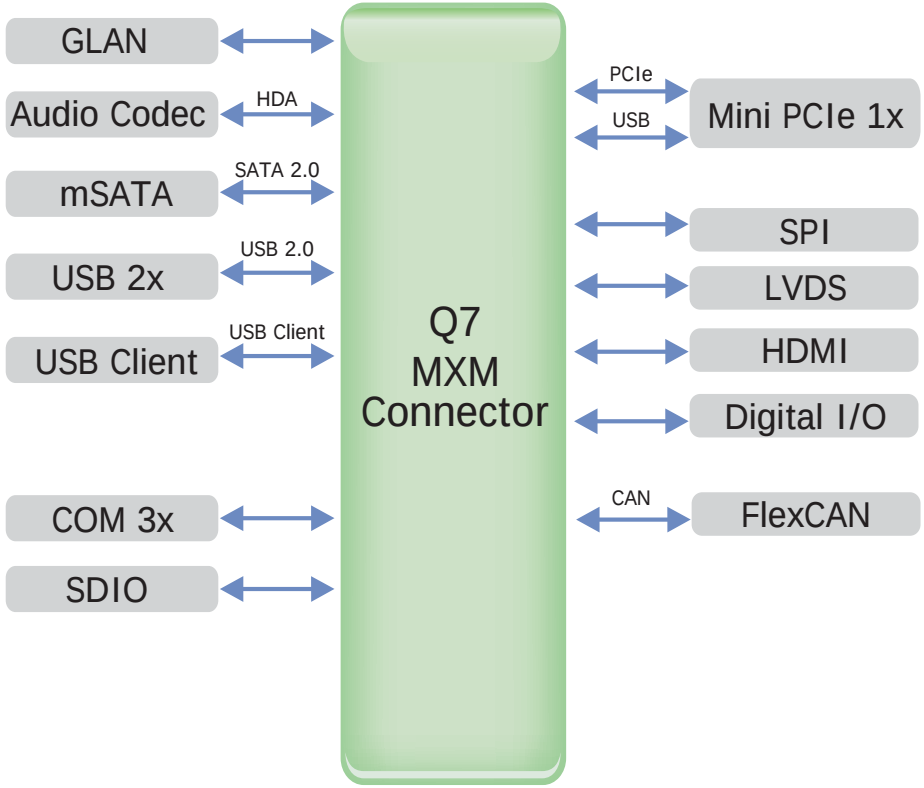
Graphics	• Display ports - 1 HDMI - 2 24-bit single channel LVDS
Audio	• Supports I^2S audio interface • 2 1W audio amplifier connectors (left and right sides)
USB	• 2 USB 2.0 ports • 1 USB Client port
Storage	• 1 mSATA via a Mini PCIe slot • 1 SD card socket
Panel I/O Ports	• 2 USB 2.0 ports • 1 USB Client port • 2 DB-9 serial ports - 1 RS232/422/485 - 1 RS232/UART • 1 RJ45 LAN port • 1 HDMI port • 1 Line-out/Mic-in jack • 1 12~36V DC-in jack
I/O Connectors	• 1 connector for an external RS232/422/485 serial port (2.0mm pitch) • 1 LVDS LCD panel connector • 2 1W audio amplifier connectors (left and right sides) • 1 FlexCAN (Flexible Controller Area Network) connector • 1 12-bit Digital I/O connector
Expansion Slots	• 1 Mini PCIe slot - supports PCIe and USB signals - supports full size Mini PCIe card • 1 SIM card socket
Temperature	• Operating: 0°C to 60°C • Storage: -20°C to 85°C
Humidity	• 10% to 90%
Board to Board Connector	• One MXM connector
Dimensions	• 190mm (7.48") x 102mm (4.02")

Chapter 2 - Hardware Installation

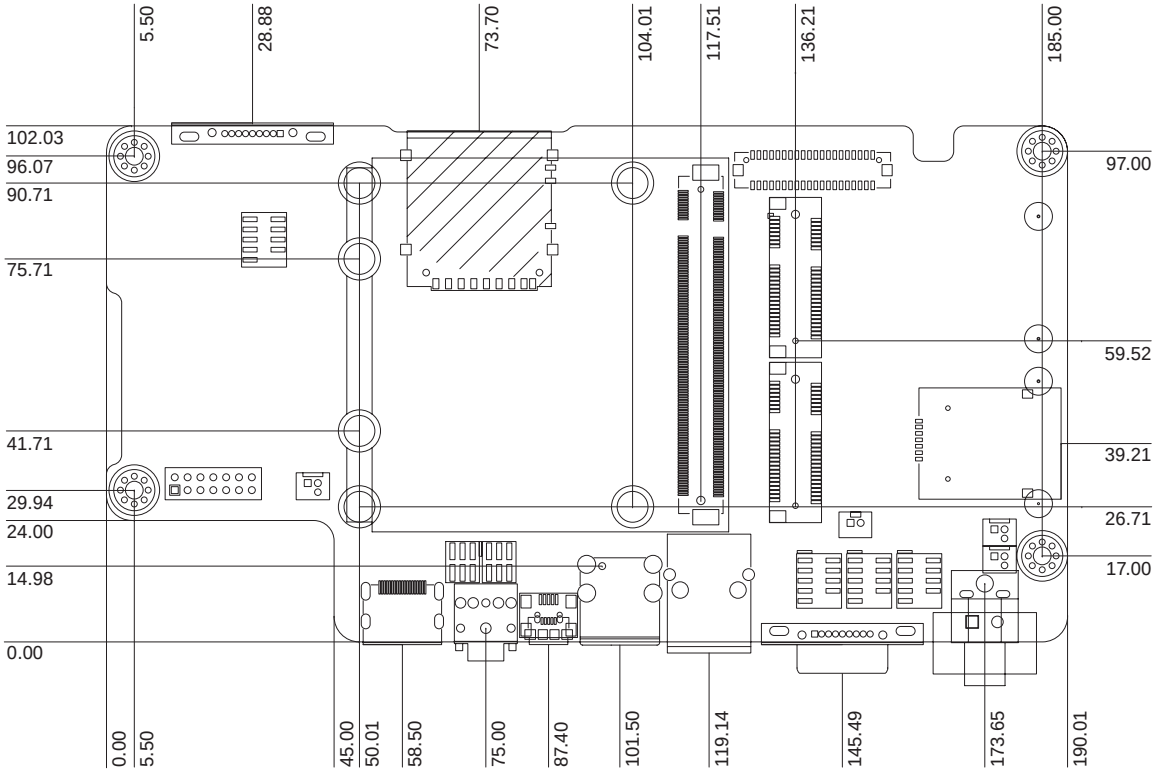
Board Layout



Block Diagram

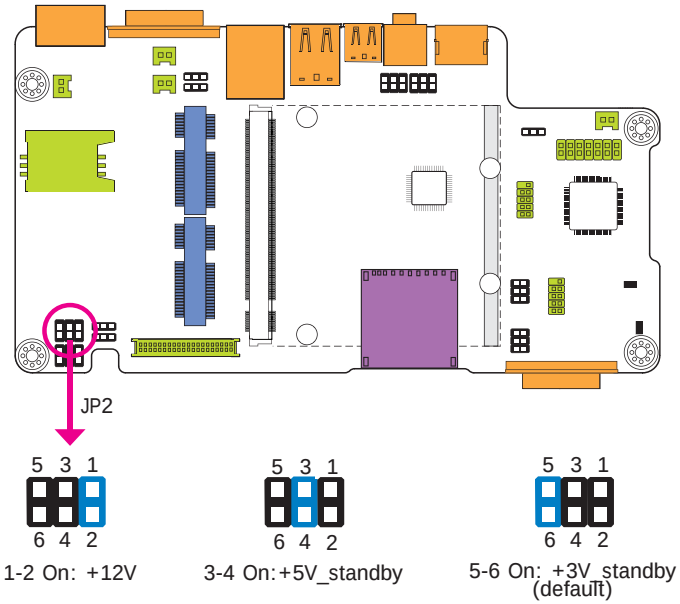


Mechanical Diagram



Jumper Settings

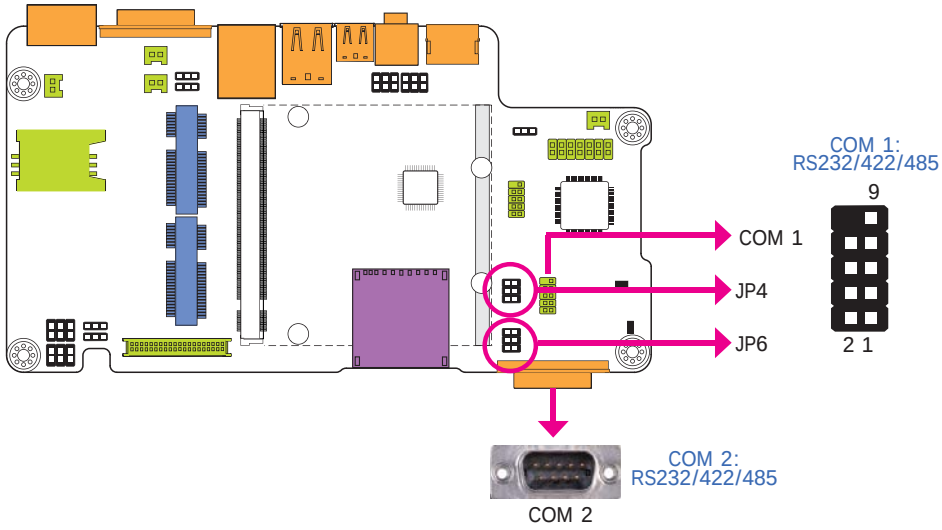
Panel Power Select



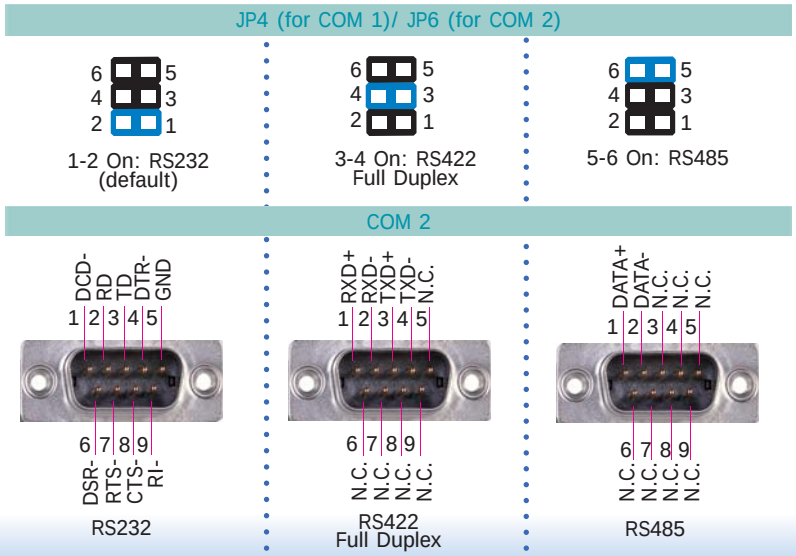
JP2 is used to select the power supplied with the LCD panel.

Important:
Before powering-on the system, make sure that the power settings of JP2 match the LCD panel's specification. Selecting the incorrect voltage will seriously damage the LCD panel.

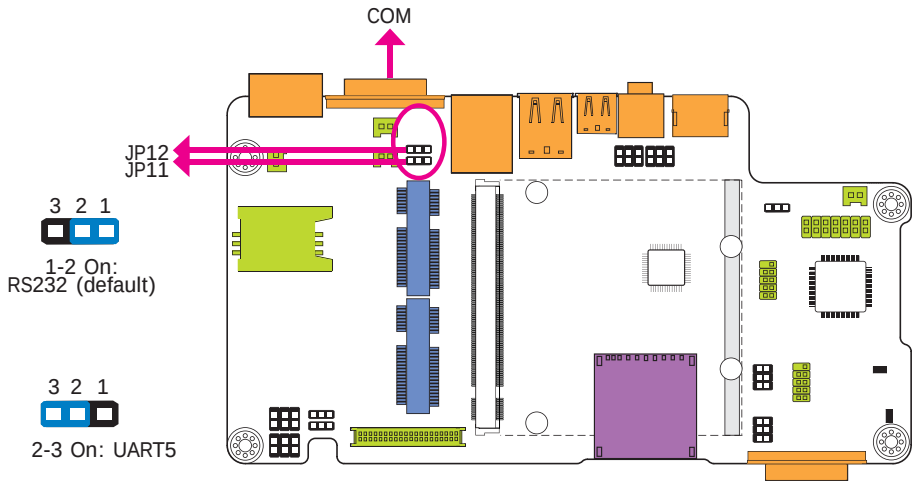
COM 1/COM 2 RS232/422/485 Select



JP4 (for COM 1) and JP6 (for COM 2) are used to configure the COM ports to RS232, RS422 (Full Duplex) or RS485. The pin functions of COM ports will vary according to jumpers' setting.



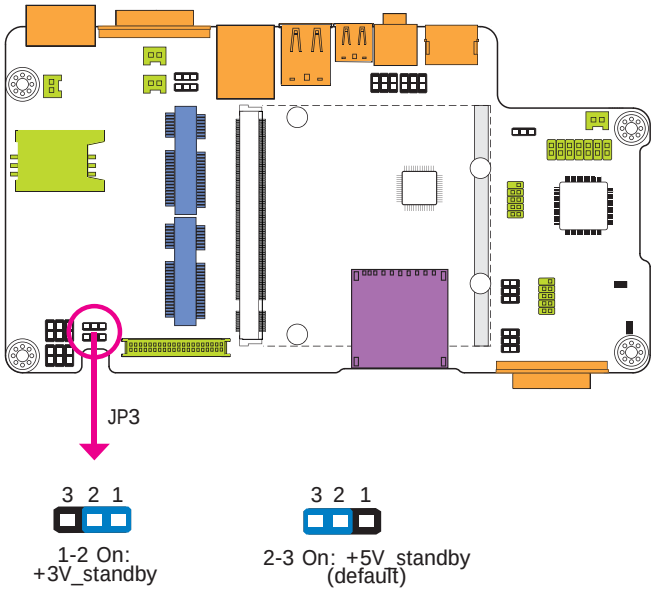
COM RS232/UART5 Select



JP11 and JP12 are used to configure the COM port to RS232 (default) or UART5.

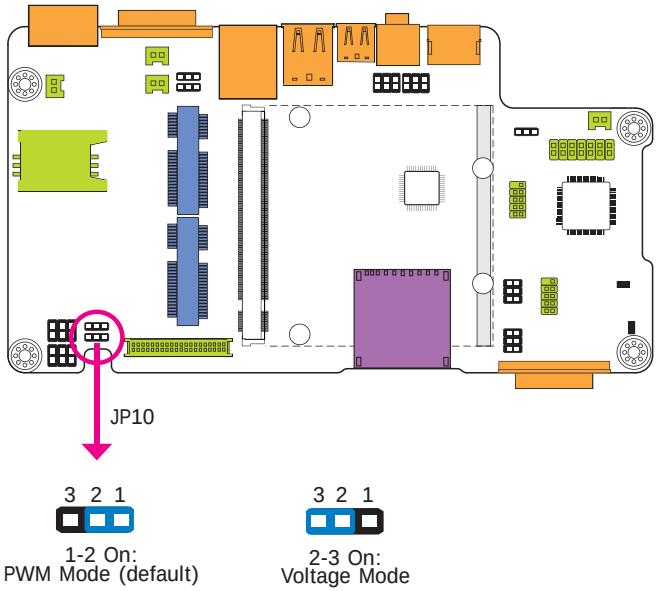
Important:
You need to set JP11 and JP12 simultaneously.

Touch Panel Power Select



JP3 controls the power level of the touch panel IC.

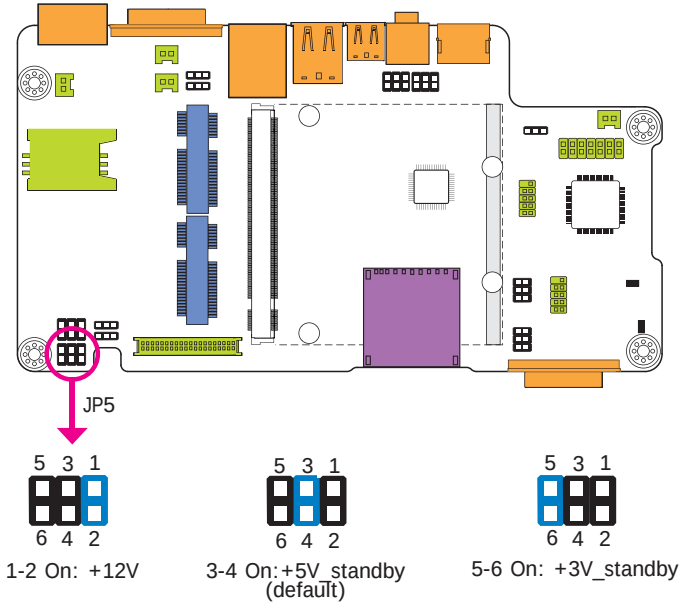
Dimming Mode Select



JP10 allows you to select the mode for the lightness control of the LVDS panel.

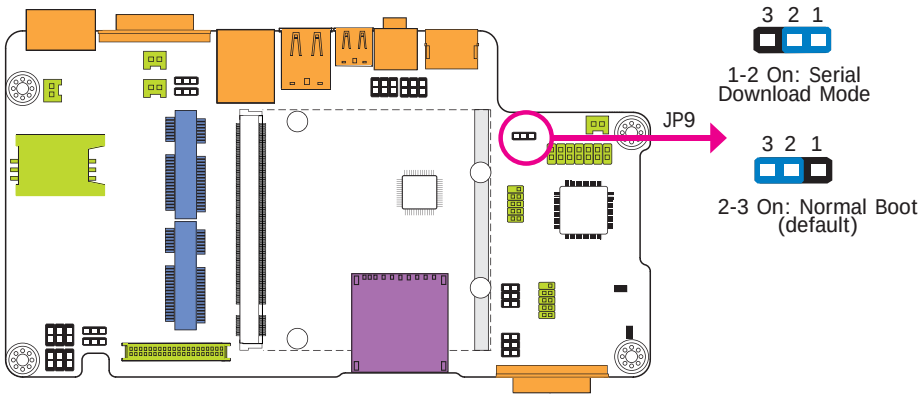
Important:
You need to refer to your panel's user guide to determine the type of mode (PWM or Voltage) most appropriate for your panel.

LCD / Inverter Power Select



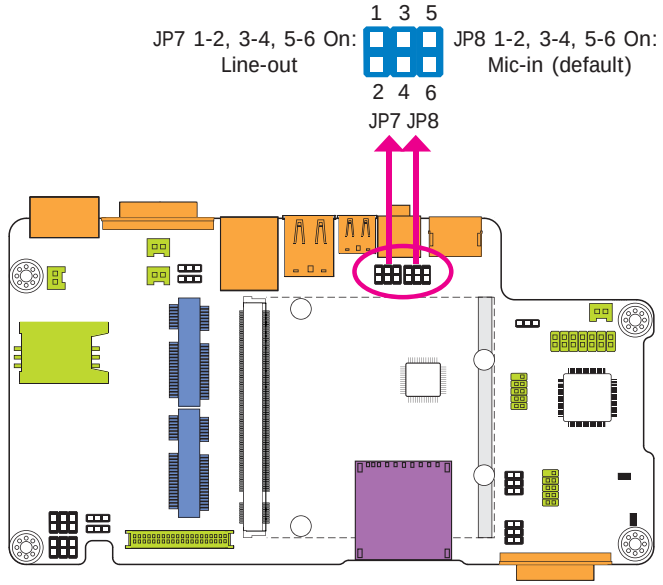
JP5 is used to select the power level of the LCD/inverter power connector.

Download Mode Select



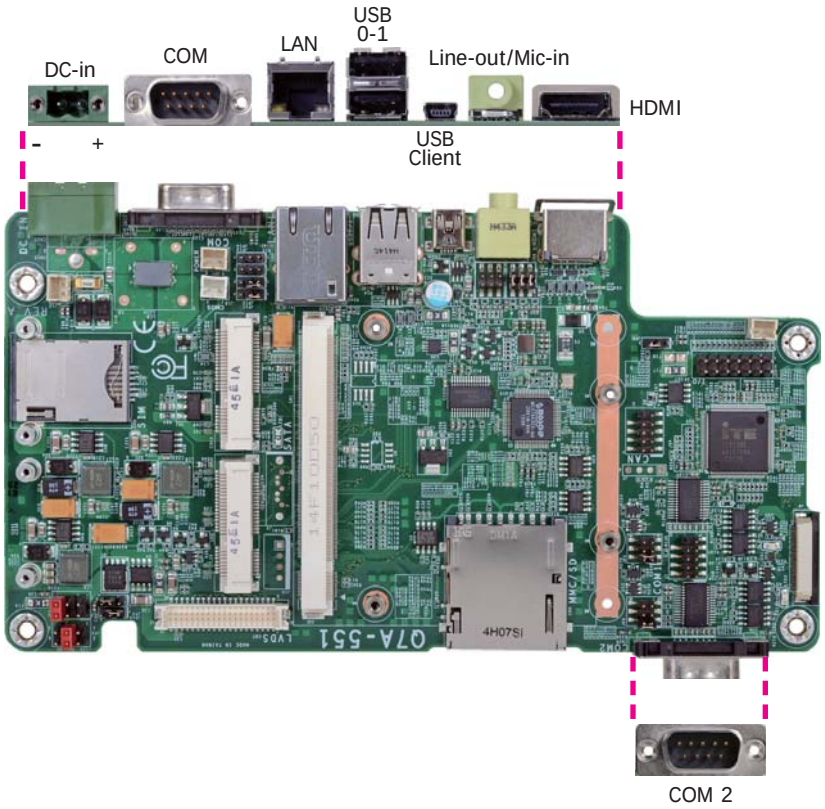
JP9 allows you to select the download mode of serial port to update the firmware and OS.

Line-out / Mic-in Select



JP7 and JP8 allow you to select the audio function. When pins 1-2, 3-4, and 5-6 are set to On, JP7 is applied for the Line-out function and JP8 is used for the Mic-in function.

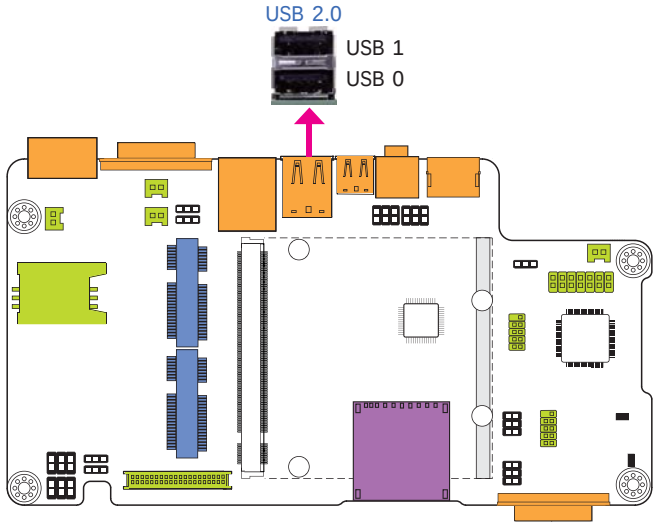
Panel I/O Ports



The panel I/O ports consist of the following:

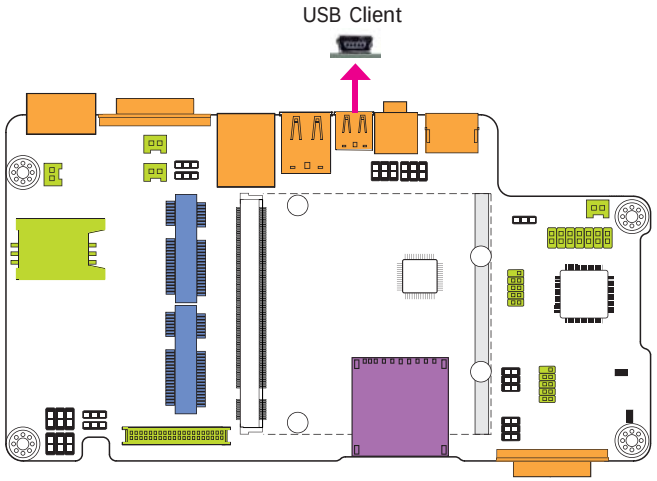
- 2 USB 2.0 ports
- 1 USB Client port
- 2 Serial COM ports
- 1 RJ45 LAN port
- 1 HDMI port
- 1 Line-out/Mic-in jack
- 1 12~36V DC-in jcak

USB Ports



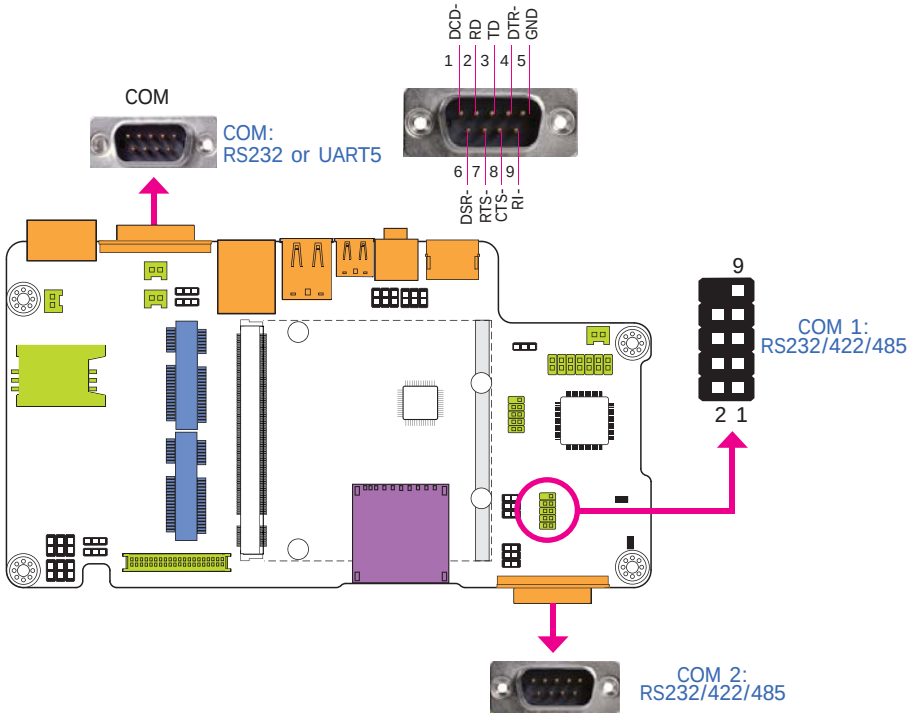
The USB device allows data exchange between your computer and a wide range of simultaneously accessible external Plug and Play peripherals. The system board is equipped with two onboard USB 2.0 ports (USB 0-1).

USB Client Port



The shape of the mini USB port is smaller than the standard one and is a device operating as a client port.

Serial (COM) Ports

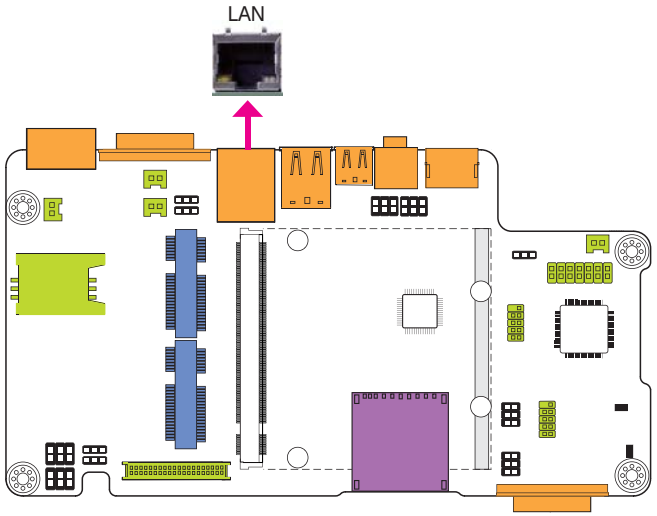


The system board is equipped with two onboard serial COM ports (COM and COM 2). It is also equipped with a 9-pin connector for connecting an external serial COM port (COM 1). COM is fixed at RS232 or UART5 via JP11's and JP12's setting at the same time. COM port 1 and COM port 2 will vary according to JP4's (for COM 1) and JP6's (for COM 2) setting respectively.

The serial COM port is RS232 asynchronous communication port with 16C550A-compatible UARTs that can be used with modems, serial printers, remote display terminals, and other serial devices. To connect COM 1, please refer to the following description. The serial port may be mounted on a card-edge bracket. Install the card-edge bracket to an available slot at the rear of the system chassis then insert the cable connector to the 9-pin connector. Make sure the colored stripe on the ribbon cable is aligned with pin 1 of the connector.

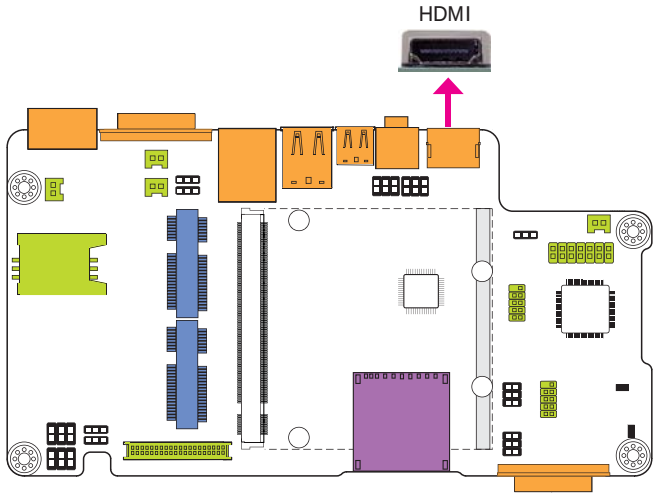
Important:
You need to set JP11 and JP12 simultaneously.

RJ45 LAN Port



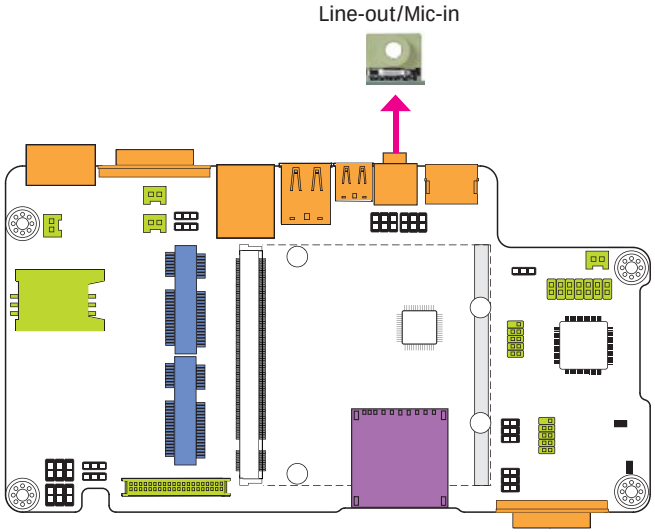
The onboard RJ45 LAN port allows the system board to connect to a local area network by means of a network hub.

HDMI Port



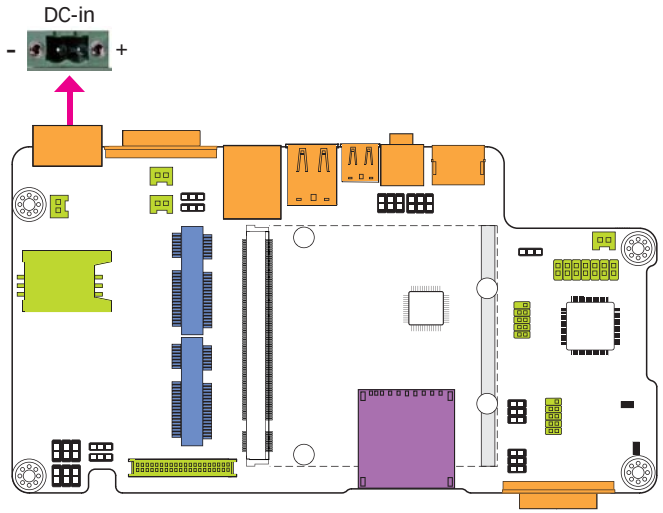
The HDMI port which carries both digital audio and video signals is used to connect a LCD monitor or digital TV that has the HDMI port.

Audio



The system board is equipped with 1 audio jack to operate as a line-out jack or a mic-in jack. A jack is a one-hole connecting interface for inserting a plug. Being a line-out jack, this jack is used to connect a headphone or external speakers. Being a mic-in jack, this jack is used to connect to the center and subwoofer speakers of the audio system.

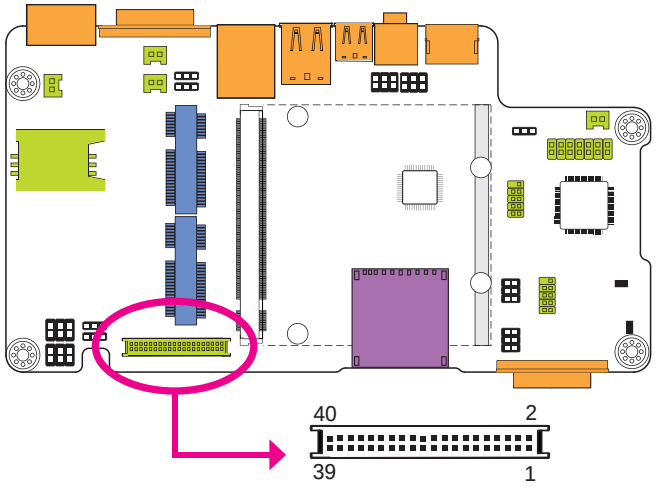
12~36V DC-in



This jack provides maximum of 60W power and is considered a low power solution. Connect a DC power cord to this jack. Use a power adapter within 12~36V DC output voltage. Using a voltage out of the range 12~36V may fail to boot the system or cause damage to the system board.

I/O Connectors

LVDS LCD Panel Connector



LVDS LCD Panel

The system board allows you to connect a LCD Display Panel by means of the LVDS LCD panel connector transmitting video signals and power from the system board to the LCD Display Panel.

Refer to the right side for the pin functions of the connector.

Jumper Settings

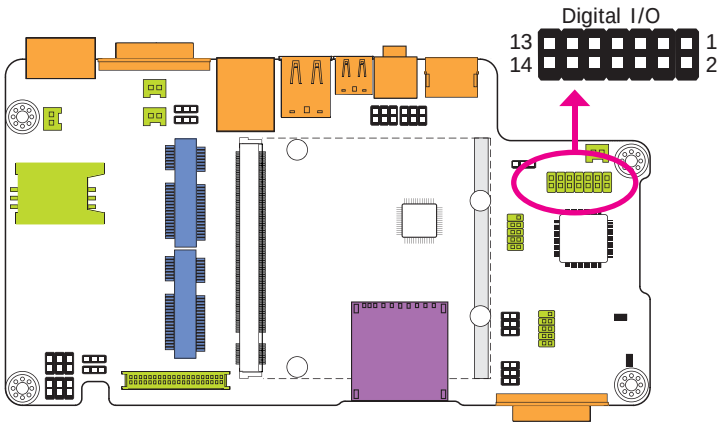
Refer to the “Jumper Settings” section in this chapter for settings relevant to the LCD panel.

Note:
DFI board's LVDS connector: Hirose DF13-40DP-1.25V(91)/40P/1.25mm; cable side connector: Hirose DF13-40DS-1.25C.

The table below illustrates the pin functions of the LVDS LCD Panel connector:

Pins	Function	Pins	Function
1	GND	2	GND
3	LVDS1_Out3+	4	LVDS0_Out3+
5	LVDS1_Out3-	6	LVDS0_Out3-
7	GND	8	GND
9	LVDS1_Out2+	10	LVDS0_Out2+
11	LVDS1_Out2-	12	LVDS0_Out2-
13	GND	14	GND
15	LVDS1_Out1+	16	LVDS0_Out1+
17	LVDS1_Out1-	18	LVDS0_Out1-
19	GND	20	GND
21	LVDS1_Out0+	22	LVDS0_Out0+
23	LVDS1_Out0-	24	LVDS0_Out0-
25	GND	26	GND
27	LVDS1_CLK+	28	LVDS0_CLK+
29	LVDS1_CLK-	30	LVDS0_CLK-
31	GND	32	GND
33	TP_INT	34	TP_SCL
35	TP_VDD	36	TP_SDA
37	Backlight Power	38	Dimming
39	Backlight Power	40	Panel Power

Digital I/O Connector



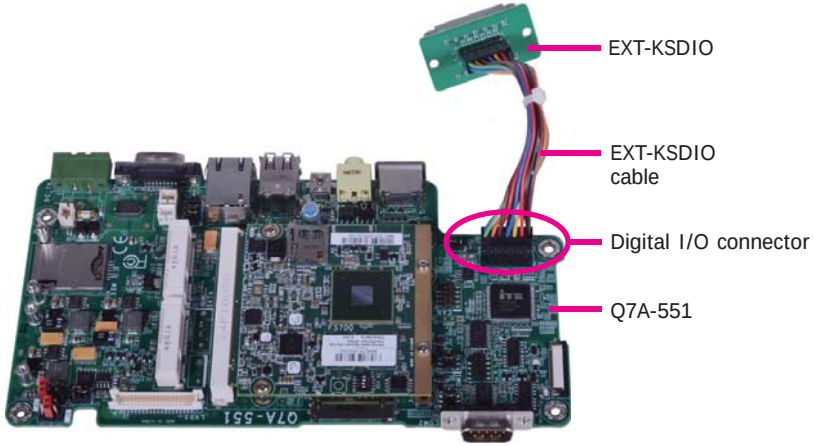
The 12-bit Digital I/O connector provides powering-on function to external devices that are connected to the connector. The pin functions of the digital I/O connector are listed below:

Digital I/O Connector

Pins	Function	Pins	Function
1	DIO_OUT-1	8	DIO_IN-4
2	DIO_IN-1	9	DIO_OUT-5
3	DIO_OUT-2	10	DIO_IN-5
4	DIO_IN-2	11	DIO_OUT-6
5	DIO_OUT-3	12	DIO_IN-6
6	DIO_IN-3	13	DCDC_5V_BB
7	DIO_OUT-4	14	GND

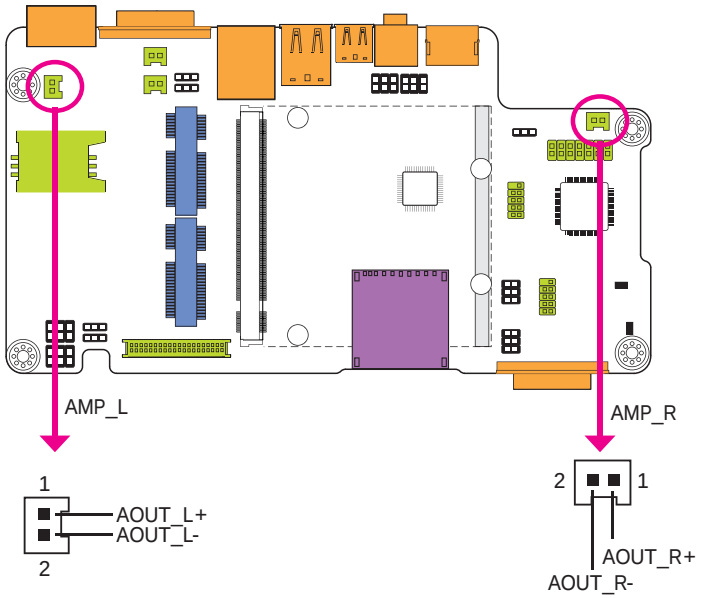
Connect the EXT-KSDIO Module to the Digital I/O Connector on the Carrier Board

The EXT-KSDIO module (8-bit digital I/O daughter board) is designed to connected to a digital I/O connector on the Q7A-551 carrier board via an EXT-KSDIO cable for extending 8-bit GPIO 7-pole terminal blocks at the I/O ports of the system unit.



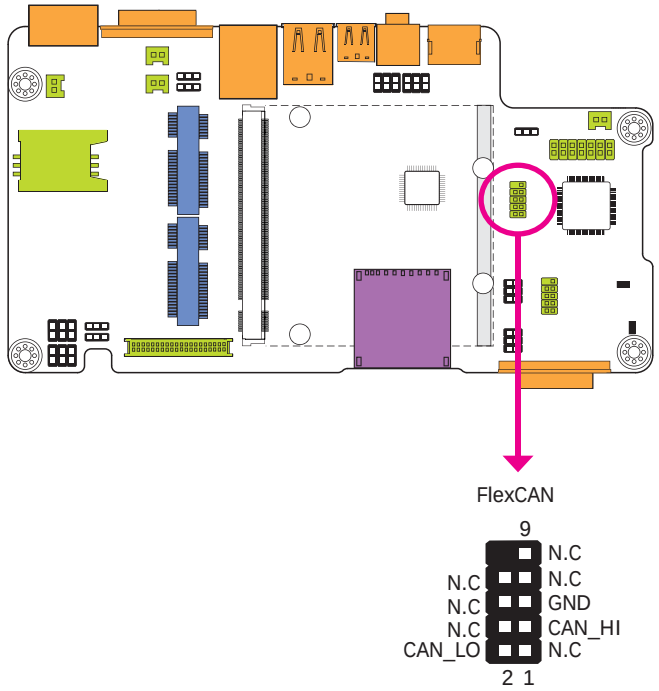
Important:
When connecting the EXT-KSDIO module to a digital I/O connector on the Q7A-551 carrier board, make sure the white dot on the EXT-KSDIO connector is aligned with pin 1 of the digital I/O connector on the carrier board. If the cause of damages due to personal incorrect installation, DFI will not be responsible for any damages.

1W Audio Amplifier Connectors



The amplify right/left connectors which have amplifying feature are used to connect external speakers.

FlexCAN Connector

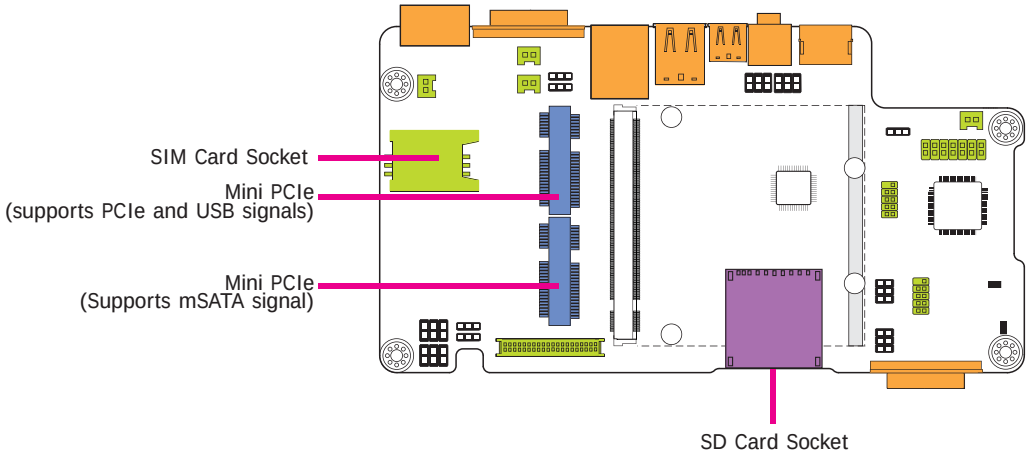


The CAN controller performs communication in accordance with the BOSCH CAN Protocol Version 2.0B Active1 (standard format and extended format). The bit rate can be programmed to a maximum of 1Mbit/s. To connect the CAN controller module to the FlexCAN connector, it is necessary to add transceiver hardware.

When communicating in a CAN network, individual message objects are configured. The message objects and the identifier masks for the receive filter for the received messages are stored in the message RAM.

Controller Area Network is a message based protocol designed specifically for automotive applications but now is also used in other areas such as industrial automation and medical equipment.

Expansion Slots



Mini PCIe Slot

The Mini PCIe socket is used to install a Mini PCIe card. Mini PCIe card is a small form factor PCI card with the same signal protocol, electrical definitions, and configuration definitions as the conventional PCI.

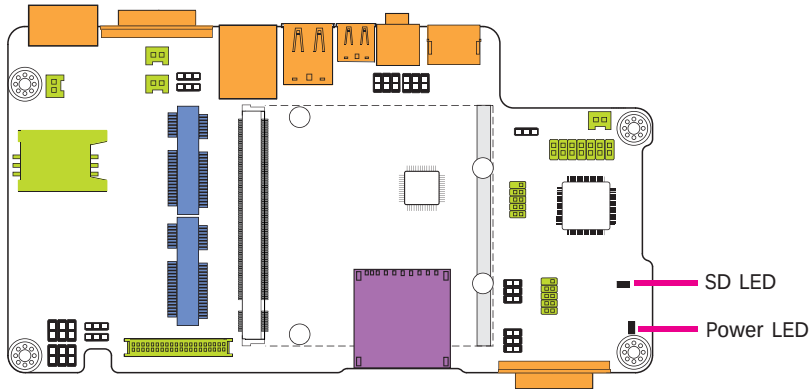
SIM Card Socket

The SIM slot on the system board is used to insert a SIM card.

SD Card Socket

This expansion port is used to insert a Secure Digital Input/Output (SDIO) device. Aside from storing data files, an SDIO card is also capable of storing powerful software applications.

LEDs



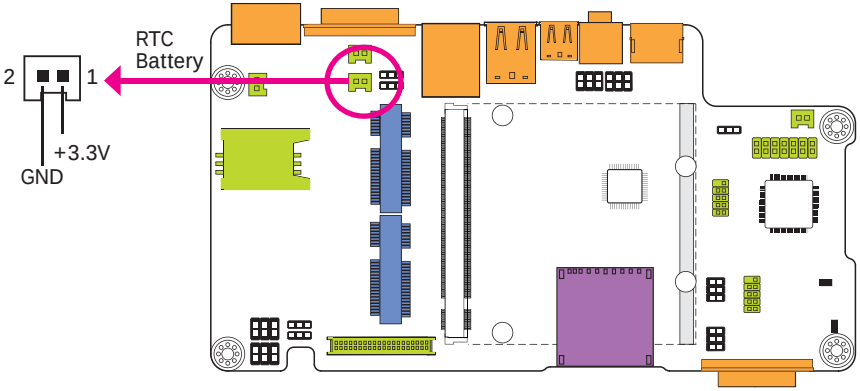
SD LED

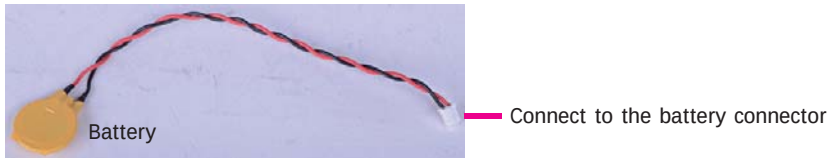
The SD LED will light when the SDIO card is inserted into the SD/MMC socket.

Power LED

The power LED indicates that there is power on the system board. Power-off the PC and then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the system board and components.

RTC Battery



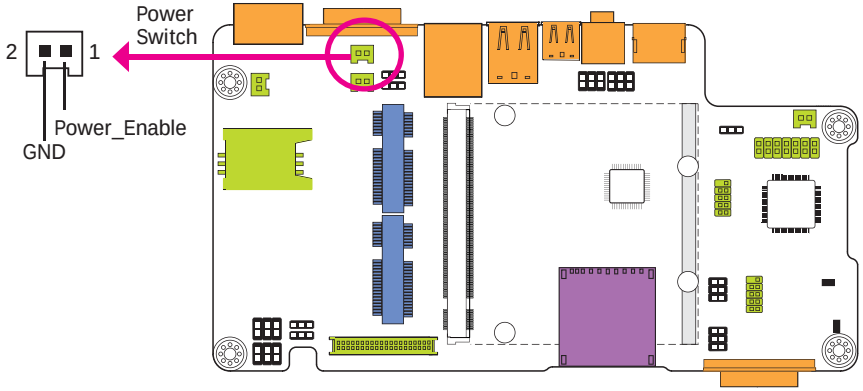


The RTC Battery powers the real-time clock and CMOS memory. It is an auxiliary source of power when the main power is shut off.

Safety Measures

- Danger of explosion if battery incorrectly replaced.
- Replace only with the same or equivalent type recommend by the manufacturer.
- Dispose of used batteries according to local ordinance.

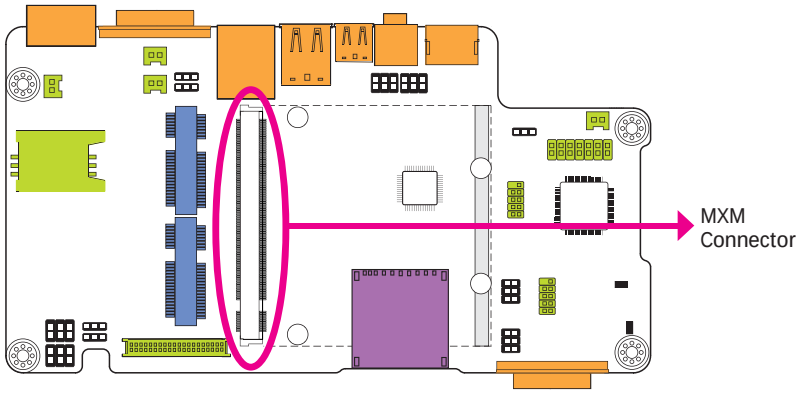
Power Switch



Power Switch

The power switch is used to power on or power off the system.

MXM Connector



The MXM connector is used to interface the carrier board with a Qseven board. Refer to the table in the following pages for the pin functions of the MXM connector.

Pin	Signal	Pin	Signal
1	GND	2	GND
3	GBE_MDI3-	4	GBE_MDI2-
5	GBE_MDI3+	6	GBE_MDI2+
7	GBE_LINK100#	8	GBE_LINK1000#
9	GBE_MDI1-	10	GBE_MDI0-
11	GBE_MDI1+	12	GBE_MDI0+
13	GBE_LINK#	14	GBE_ACT#
15		16	SUS_S5#
17	WAKE#	18	SUS_S3#
19	SUS_STAT#	20	PWRBTN#
21	SLP_BTN#	22	LID_BTN#
23	GND	24	GND
25	GND	26	PWGIN
27	BATLOW#	28	RSTBTN#
29	SATA0_TX+	30	
31	SATA0_TX-	32	
33	SATA0_ACT#	34	GND
35	SATA0_RX+	36	
37	SATA0_RX-	38	
39	GND	40	GND
41	BIOS_DISABLE#/BOOT_ALT#	42	SDIO_CLK
43	SDIO_CD#	44	SDIO_LED
45	SDIO_CMD	46	SDIO_WP
47	SDIO_PWR#	48	SDIO_DAT1
49	SDIO_DAT0	50	SDIO_DAT3
51	SDIO_DAT2	52	SDIO_DAT5
53	SDIO_DAT4	54	SDIO_DAT7
55	SDIO_DAT6	56	RSVD
57	GND	58	GND
59	I2S_TXFS	60	SMB_CLK
61	I2S_CLK	62	SMB_DAT
63	I2S_TXC	64	SMB_ALERT#
65	I2S_RXD	66	I2C_CLK
67	I2S_TXD	68	I2C_DAT
69		70	WDTRIG#
71		72	WDOUT
73	GND	74	GND
75		76	
77		78	
79		80	USB_4_5_OC#
81		82	USB_P4-
83		84	USB_P4+
85	USB_2_3_OC#	86	USB_0_1_OC#
87	USB_P3-	88	USB_P2-
89	USB_P3+	90	USB_P2+
91	USB_CC	92	USB_ID
93	USB_P1-	94	USB_P0-
95	USB_P1+	96	USB_P0+
97	GND	98	GND
99	LVDS_A0+	100	LVDS_B0+

Pin	Signal	Pin	Signal
101	LVDS_A0-	102	LVDS_B0-
103	LVDS_A1+	104	LVDS_B1+
105	LVDS_A1-	106	LVDS_B1-
107	LVDS_A2+	108	LVDS_B2+
109	LVDS_A2-	110	LVDS_B2-
111	LVDS_PPEN	112	LVDS_BLEN
113	LVDS_A3+	114	LVDS_B3+
115	LVDS_A3-	116	LVDS_B3-
117	GND	118	GND
119	LVDS_A_CLK+	120	LVDS_B_CLK+
121	LVDS_A_CLK-	122	LVDS_B_CLK-
123	LVDS_BLT_CTRL/GP_PWM_OUT0	124	RSVD
125	LVDS_DID_DAT/GP_I2C_DAT	126	LVDS_BLC_DAT
127	LVDS_DID_CLK/GP_I2C_CLK	128	LVDS_BLC_CLK
129	CAN0_TX	130	CAN0_RX
131	TMDS_CLK+	132	
133	TMDS_CLK-	134	
135	GND	136	GND
137	TMDS_LANE1+	138	
139	TMDS_LANE1-	140	
141	GND	142	GND
143	TMDS_LANE0+	144	
145	TMDS_LANE0-	146	
147	GND	148	GND
149	TMDS_LANE2+	150	HDMI_CTRL_DAT
151	TMDS_LANE2-	152	HDMI_CTRL_CLK
153	HDMI_HPD#	154	
155	PCIE_CLK_REF+	156	PCIE_WAKE#
157	PCIE_CLK_REF-	158	PCIE_RST#
159	GND	160	GND
161		162	
163		164	
165	GND	166	GND
167		168	
169		170	
171	UART_TXD	172	UART_RTS
173		174	
175		176	
177	UART_RXD	178	UART_CTS
179	PCIE0_TX+	180	PCIE0_RX+
181	PCIE0_TX-	182	PCIE0_RX-
183	GND	184	GND
185		186	
187		188	
189		190	
191		192	
193	VCC_RTC	194	
195		196	
197	GND	198	GND
199	SPI_MOS1	200	SPI_CS0#

Pin	Signal	Pin	Signal
201	SPI_MOS0	202	
203	SPI_SCK	204	MFG_NC4
205	5V_SB	206	5V_SB
207	MFG_NC0	208	MFG_NC2
209	MFG_NC1	210	MFG_NC3
211	VCC (+5V)	212	VCC (+5V)
213	VCC (+5V)	214	VCC (+5V)
215	VCC (+5V)	216	VCC (+5V)
217	VCC (+5V)	218	VCC (+5V)
219	VCC (+5V)	220	VCC (+5V)
221	VCC (+5V)	222	VCC (+5V)
223	VCC (+5V)	224	VCC (+5V)
225	VCC (+5V)	226	VCC (+5V)
227	VCC (+5V)	228	VCC (+5V)
229	VCC (+5V)	230	VCC (+5V)